PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2002-321210

(43)Date of publication of application : 05.11.2002

(51)Int.Cl. B28B 3/26
B01D 53/86
B01J 35/04
F01N 3/28

(21)Application number : 2001-376245

(22)Date of filing : 10.12.2001

(71)Applicant : DENSO CORP

(72)Inventor : YAMADA KEIICHI
HIRATSUKA YUICHI
MURATA MASAKAZU
TANAKA MASAICHI

(30)Priority

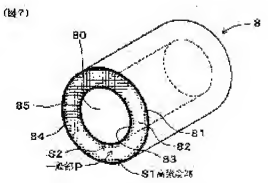
Priority number : 2001050844 Priority date : 26.02.2001 Priority country : JP
2001050845 26.02.2001 JP

(54) MOLDING DIE, HOLLOW TYPE CERAMIC MONOLITHIC CARRIER, ITS MANUFACTURING METHOD AND CATALYTIC CONVERTER SYSTEM

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a method for manufacturing a hollow type ceramic monolithic carrier of a high isostatic strength, while a method for manufacturing the hollow type ceramic monolithic carrier at a low manufacturing cost and a molding die are provided.

SOLUTION: A main body part 82 having many cells 45 surrounded by a honeycomb type bulkhead 84, a hollow hole 80 provided so as to pass through longitudinally in a central part of the main body part 82, a peripheral skin part 81 covering a peripheral surface of the main body part 82 and an inside peripheral skin part 83 covering an inside peripheral surface of the main body part 82 are provided. A bulkhead 84 positioning between a content of 1 to 10 cells from the inside peripheral skin part 83 is made a high strength part S2 of a higher strength than that of a general part P being the bulkhead 84 positioning outside that.



* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1]A metallic mold which has an introducing hole part which provided an introducing hole which introduces material, and the slit part which provided a slit groove which is open for free passage to the above-mentioned introducing hole, and fabricates material to honeycomb shape, A periphery gate operating ring which has a periphery raised part prolonged from a peripheral edge of the above-mentioned slit part to the direction of extrusion, and a periphery lobe which it has projected toward an inner direction from this periphery raised part, and has a gap between the above-mentioned slit parts, A dice for shaping of a hollow type ceramic monolith carrier having an inner circumference gate operating ring which has an inner circumference raised part prolonged from a center section of the above-mentioned slit part to the direction of extrusion, and an inner circumference lobe which it has projected toward a method of outside from this inner circumference raised part, and has a gap between the above-mentioned slit parts.
[Claim 2]A dice for shaping of a hollow type ceramic monolith carrier, wherein a gap between the above-mentioned inner circumference lobe and the above-mentioned slit part is in the range of 0.05-2 mm in claim 1.
[Claim 3]A dice for shaping of a hollow type ceramic monolith carrier characterized by C1/C2 being 0.8-1.2 when a gap of C1, the above-mentioned inner circumference lobe, and the above-mentioned slit part is set to C2 for a gap of the above-mentioned periphery lobe and the above-mentioned slit part in claim 1 or 2.
[Claim 4]A dice for shaping of a hollow type ceramic monolith carrier in which width of the above-mentioned slit part located in before a method of outside by one to 10 cell from a tip of the above-mentioned inner circumference lobe is characterized by a large thing in the above-mentioned metallic mold in claims 1-3 compared with other slit width.
[Claim 5]A dice for shaping of a hollow type ceramic monolith carrier in which width of the above-mentioned slit part located between inner directions by one to 10 cell from a tip of the above-mentioned periphery lobe is characterized by a large thing in the above-mentioned metallic mold in any 1 paragraph of claims 1-4 compared with other slit width.
[Claim 6]A metallic mold which has an introducing hole part which provided an introducing hole

which introduces material, and the slit part which provided a slit groove which is open for free passage to the above-mentioned introducing hole, and fabricates material to honeycomb shape, A periphery gate operating ring which has a periphery raised part prolonged from a peripheral edge of the above-mentioned slit part to the direction of extrusion, and a periphery lobe which it has projected toward an inner direction from this periphery raised part, and has a gap between the above-mentioned slit parts, Have projected toward a method of outside from an inner circumference raised part prolonged from a center section of the above-mentioned slit part to the direction of extrusion, and this inner circumference raised part, and. By carrying out extrusion molding of the charge of a ceramic material using a dice for shaping which has an inner circumference gate operating ring which has an inner circumference lobe which has a gap between the above-mentioned slit parts, By a charge of a ceramic material which passes through a gap between the above-mentioned periphery lobe of the above-mentioned periphery gate operating ring, and the above-mentioned slit part. By a charge of a ceramic material which forms a peripheral skin part and passes through a gap between the above-mentioned inner circumference lobe of the above-mentioned inner circumference gate operating ring, and the above-mentioned slit part. Manufacturing a hollow type ceramic monolith carrier which has a hollow hole inside the above-mentioned inner circumference skin part by forming an inner circumference skin part and forming a body part of honeycomb shape by a charge of a ceramic material which is surrounded by this inner circumference skin part and the above-mentioned peripheral skin part, and is extruded from the above-mentioned slit part **. A manufacturing method of a hollow type ceramic monolith carrier considered as a mark.

[Claim 7]A manufacturing method of a hollow type ceramic monolith carrier, wherein a gap between the above-mentioned inner circumference lobe and the above-mentioned slit part is in the range of 0.05-2 mm in claim 6.

[Claim 8]A manufacturing method of a hollow type ceramic monolith carrier characterized by C1/C2 being 0.8-1.2 when a gap of C1, the above-mentioned inner circumference lobe, and the above-mentioned slit part is set to C2 for a gap of the above-mentioned periphery lobe and the above-mentioned slit part in claim 6 or either of 7.

[Claim 9]A manufacturing method of a hollow type ceramic monolith carrier with which width of the above-mentioned slit part located in before a method of outside by one to 10 cell from a tip of the above-mentioned inner circumference lobe is characterized by a large thing in the above-mentioned metallic mold in claims 6-8 compared with other slit width.

[Claim 10]A manufacturing method of a hollow type ceramic monolith carrier with which width of the above-mentioned slit part located between inner directions by one to 10 cell from a tip of the above-mentioned periphery lobe is characterized by a large thing in the above-mentioned metallic mold in any 1 paragraph of claims 6-9 compared with other slit width.

[Claim 11]A body part which has a cell of a large number surrounded by septum of honeycomb shape, and a hollow hole provided so that it might penetrate to a longitudinal direction in a center section of this body part, For a wrap inner circumference skin part, have a peripheral face of the above-mentioned body part, and inner skin of a wrap peripheral skin part and the above-mentioned body part in between for one to 10 cell from the above-mentioned inner

circumference skin part. A hollow type ceramic monolith carrier making the located above-mentioned septum into a high strength part whose intensity is higher than a general part which is a septum located in a method of the outside.

[Claim 12]A hollow type ceramic monolith carrier making the above-mentioned septum located in between for one to 10 cell from the above-mentioned peripheral skin part into a high strength part whose intensity is higher than a general part which is a septum located in the inner direction in claim 11.

[Claim 13]A hollow type ceramic monolith carrier, wherein a high strength part of the above-mentioned septum has raised intensity by making thickness larger than the above-mentioned general part in claim 11 or 12.

[Claim 14]A hollow type ceramic monolith carrier characterized by ranges of T1/T2 being 0.8-1.2 when thickness of T1 and the above-mentioned inner circumference skin part is set to T2 for thickness of the above-mentioned peripheral skin part in any 1 paragraph of claims 11-13.

[Claim 15]In a catalyst converter system arranged at an exhaust system of an internal-combustion engine, this catalyst converter system, The 1st catalytic converter constituted using a hollow type ceramic monolith carrier of a statement in any 1 paragraph of claims 11-14, Many cells and peripheral faces which were surrounded by septum of honeycomb shape. Have the 2nd catalytic converter constituted using an inner substance type ceramic monolith carrier which has a wrap peripheral skin part, and the 1st catalytic converter of the above, Build in the above-mentioned hollow type ceramic monolith carrier which is arranged at the upstream of the above-mentioned exhaust system, and made the 1st catalyst support, and. A bypass passage allotted to the above-mentioned hollow hole and a purification channel which consists of many above-mentioned cells of a method of the outside, Between the above-mentioned bypass passage and the above-mentioned purification channel, have a passage switching means which changes a channel of the above-mentioned exhaust gas, and the 2nd catalytic converter of the above, A catalyst converter system, wherein it is arranged at the downstream of the above-mentioned exhaust system, it builds in the above-mentioned inner substance type ceramic monolith carrier which made the 2nd catalyst support and the 1st catalyst of the above carries out an activity start at a temperature lower than the 2nd catalyst of the above.

[Claim 16]A catalyst converter system, wherein the above-mentioned passage switching means is constituted in claim 15 according to load of the above-mentioned internal-combustion engine so that a change to the above-mentioned bypass passage and the above-mentioned purification channel may be performed.

[Claim 17]A catalyst converter system, wherein the above-mentioned passage switching means is constituted in claim 15 according to temperature of a cooling medium of the above-mentioned internal-combustion engine so that a change to the above-mentioned bypass passage and the above-mentioned purification channel may be performed.

[Claim 18]A catalyst converter system, wherein the above-mentioned above-mentioned passage switching means is constituted in claim 15 according to combination of load of the above-mentioned internal-combustion engine, and temperature of the above-mentioned

cooling medium so that a change to the above-mentioned bypass passage and the above-mentioned purification channel may be performed.

[Claim 19]A catalyst converter system characterized by the 1st catalyst of the above being a superthermal activity catalyst whose light on temperature is 300 ** or less in any 1 paragraph of claims 15-18.

[Claim 20]A catalyst converter system characterized by the 1st catalyst of the above being a superthermal activity catalyst whose light on temperature is 200 ** or less in any 1 paragraph of claims 15-18.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention]This invention relates to a honeycomb structured body made from the cordierite used for the catalyst support of the exhaust gas purifying system of an internal-combustion engine, and a manufacturing method for the same.
[0002]
[Description of the Prior Art]As a system which purifies the exhaust gas of the internal-combustion engine of a car, the precious metals, such as platinum and rhodium, are made into a catalyst, and there is a catalyst converter system which made the ceramic carrier support these precious metals, and constituted them. In the above-mentioned catalyst converter system, harmful HC in exhaust gas, CO, NOx, etc. are changed into harmless H_2O and CO_2 using oxidation reaction of the above-mentioned precious metals, or an oxidation-reduction reaction. The ceramic carrier used for this catalyst converter system is using as the substrate what is called a monolith carrier with the septum (rib) of honeycomb shape, and the hole (cell) surrounded by this, and catalyst precious metals are supported by the septum of the above-mentioned monolith carrier.
[0003]By the way, these catalysts are not activated unless temperature becomes to some extent high, and they cannot purify exhaust gas efficiently. That is, there was a problem that the degree of converter internal temperature was low immediately after putting the above-mentioned internal-combustion engine into operation, and exhaust gas was hard to be purified. So, in the severe area of recent years especially emission control, forming two catalytic converters in series gains popularity.
[0004]The catalytic converter (it is called UF catalyst below) specifically left and arranged from the catalytic converter (it is called CC catalyst below) and engine which have been arranged directly under an engine is connected in series. CC catalyst bears improvement in the activity at the time of low temperature (low-temperature activity), and UF catalyst is bearing improvement in a purifying rate absolutely, respectively. The means which carries out temperature up early as a means to aim at improvement in activity of CC catalyst, bringing close to an internal-combustion engine as much as possible, by making septum thickness of a

monolith carrier thin, etc., Or there are a means to raise the performance in the low temperature of the catalyst itself etc., making the kind of precious metals into a thing strong against low-temperature activity, by making precious-metals particle diameter small, etc. It is effective in the improvement in low-temperature activity to make precious-metals particle diameter small especially in this.

[0005]However, if precious-metals particle diameter is made small, heat resistance will pose a problem. That is, if a catalyst becomes an elevated temperature (for example, not less than 800 **), heat condensation will be caused, the specific surface area falls rapidly, and low-temperature activity power declines. Then, what is called a bypass system CC catalyst system that passes exhaust gas for CC catalyst at the time of engine start and middle load operation whose emission temperature is not high, and does not pass exhaust gas at the time of the heavy load in which emission temperature becomes an elevated temperature is proposed.

[0006]As one of the bypass means of this, a butterfly valve is provided in the so-called center section of the hollow type monolith carrier which made the hole in the center section of the monolith carrier, and there is a system which switches exhaust gas to a monolith part and a center section. A butterfly valve is closed immediately after engine start, as all exhaust gas passes a carrier, it makes low-temperature activity good, and he opens a valve and is trying for exhaust gas to pass in the center section in this system for the prevention from heat condensation of CC catalyst at the time of a heavy load.

[0007]As for the hollow type monolith carrier used for the above-mentioned system, it is common to make a hole in the center section of the monolith carrier by a drill cutter as indicated by JP,9-220480,A, for example. However, in a ******** case, a man day increases the honeycomb structured body extruded cylindrical by the ******** process added. The honeycomb center section which is not **********(ed) becomes useless. So, it is difficult to make a manufacturing cost cheap by this method.

[0008]A defect will be provided in the monolith carrier which is a structure, and there were a carrier's own intensity and a fault that especially isostatic intensity (static disruptive strength) will fall. Especially the honeycomb structured body inner periphery that has **********(ed) will be in the state where the cell wall (septum) of 0.05-0.3 mm and a thin honeycomb structured body was exposed. And since the cell wall is directly attached to piping via a mat, when attaching, and when a mat expands at the time of an elevated temperature, the fault that a cell wall is destroyed, for example in the case of Inta Lamb Matt's not less than 400 ** rapid thermal expansion arises.

[0009]In order to prevent the above-mentioned fault, even when reinforcing with the ceramics of a honeycomb structured body and same material, etc., compared with the honeycomb structured body as for which the thickness of the honeycomb structured body inner periphery which has **********(ed) becomes uneven at, and ********** does not have it, a strong fall is caused remarkably. Since the metal carrier which is excellent in intensity on the other hand carries out the lap winding of the wave foil which carried out wave processing with the even metallic foil, and is formed, a coefficient of thermal expansion is large and foil rolling, processing, and junction are difficult, a manufacturing cost is size. Therefore, it is difficult to

apply a metal carrier to catalyst support.

[0010]

[Problem(s) to be Solved]The hollow type ceramic monolith carrier with high isostatic intensity in which this invention was made in view of this conventional problem, It is going to provide the dice for shaping used for the manufacturing method and this which can manufacture this hollow type ceramic monolith carrier with a cheap manufacturing cost, and the catalyst converter system which applied the above-mentioned hollow type ceramic monolith carrier further.

[0011]

[Means for Solving the Problem]A metallic mold which has the slit part which provided a slit groove which an invention of claim 1 is open for free passage to the above-mentioned introducing hole with an introducing hole part which provided an introducing hole which introduces material, and fabricates material to honeycomb shape, A periphery gate operating ring which has a periphery raised part prolonged from a peripheral edge of the above-mentioned slit part to the direction of extrusion, and a periphery lobe which it has projected toward an inner direction from this periphery raised part, and has a gap between the above-mentioned slit parts, Have projected toward a method of outside from an inner circumference raised part prolonged from a center section of the above-mentioned slit part to the direction of extrusion, and this inner circumference raised part, and. It is in a dice for shaping of a hollow type ceramic monolith carrier having an inner circumference gate operating ring which has an inner circumference lobe which has a gap between the above-mentioned slit parts.

[0012]A dice for shaping of this invention has not only the above-mentioned periphery gate operating ring but the above-mentioned inner circumference gate operating ring. And this periphery gate operating ring and an inner circumference gate operating ring had the above-mentioned periphery raised part, a periphery lobe and an inner circumference raised part, and a periphery raised part, respectively, and all have secured the above-mentioned gap between the above-mentioned slit parts. Therefore, if extrusion molding is carried out using this dice for shaping, a body part of honeycomb shape which could enforce certainly a manufacturing method of a hollow type ceramic monolith carrier shown below, and was inserted into a peripheral skin part, an inner circumference skin part, and this will be fabricated in one. A becoming hollow type ceramic monolith carrier can be obtained easily. So, a hollow type ceramic monolith carrier with high isostatic intensity can be manufactured with a cheap manufacturing cost.

[0013]A metallic mold which has the slit part which provided a slit groove which an invention of claim 6 is open for free passage to the above-mentioned introducing hole with an introducing hole part which provided an introducing hole which introduces material, and fabricates material to honeycomb shape, A periphery gate operating ring which has a periphery raised part prolonged from a peripheral edge of the above-mentioned slit part to the direction of extrusion, and a periphery lobe which it has projected toward an inner direction from this periphery raised part, and has a gap between the above-mentioned slit parts, Have projected toward a method of outside from an inner circumference raised part prolonged from a center section of the

above-mentioned slit part to the direction of extrusion, and this inner circumference raised part, and. By carrying out extrusion molding of the charge of a ceramic material using a dice for shaping which has an inner circumference gate operating ring which has an inner circumference lobe which has a gap between the above-mentioned slit parts, By a charge of a ceramic material which passes through a gap between the above-mentioned periphery lobe of the above-mentioned periphery gate operating ring, and the above-mentioned slit part. By a charge of a ceramic material which forms a peripheral skin part and passes through a gap between the above-mentioned inner circumference lobe of the above-mentioned inner circumference gate operating ring, and the above-mentioned slit part. A hollow type ceramic monolith carrier which has a hollow hole inside the above-mentioned inner circumference skin part by forming an inner circumference skin part and forming a body part of honeycomb shape by a charge of a ceramic material which is surrounded by this inner circumference skin part and the above-mentioned peripheral skin part, and is extruded from the above-mentioned slit part. It is in a manufacturing method of a manufacturing hollow type ceramic monolith carrier.

[0014]Extrusion molding of this manufacturing method is carried out using a dice for shaping of the above-mentioned specific composition. That is, as mentioned above, a dice for shaping which equipped a metallic mold with the above-mentioned periphery gate operating ring and an inner circumference gate operating ring is used. Thereby, integral moulding of the hollow type ceramic monolith carrier accompanied by the above-mentioned peripheral skin part and an inner circumference skin part can be easily carried out to a peripheral face and inner skin of a body part of honeycomb shape only by performing the above-mentioned extrusion molding.

[0015]As for a gap between the above-mentioned inner circumference lobe and the above-mentioned slit part, like claim 2 and an invention of seven, it is preferred that it is in the range of 0.05-2 mm. In there being a possibility that the above-mentioned inner circumference skin part can be stabilized, and cannot form when the above-mentioned gap is less than 0.05 mm and exceeding 2 mm, material supplying becomes superfluous, a cell kink of a honeycomb shape body part is generated, or a skin part is formed wavelike, and there is a problem of causing strength reduction. So, the above-mentioned gap has the preferably good range of 0.1-0.5 mm.

[0016]Like claim 3 and an invention of eight, when a gap of C1, the above-mentioned inner circumference lobe, and the above-mentioned slit part is set to C2 for a gap of the above-mentioned periphery lobe and the above-mentioned slit part, it is preferred that C1/C2 are 0.8-1.2. By thus, a thing for which the ratios C1/C2 of the above C1 and the above C2 are set as the range of 0.8-1.2. In the above-mentioned hollow type ceramic monolith carrier manufactured with this manufacturing method or a Motoshige form dice, a difference between thickness of the above-mentioned inner circumference skin part and thickness of the above-mentioned peripheral skin part can be carried out fixed within the limits.

[0017]Thickness of a peripheral skin part becomes it thin that the above C1/C2 is less than 0.8 too much compared with thickness of an inner circumference skin part. So, in the above-mentioned hollow type ceramic monolith carrier by which extrusion molding was carried out, when drying after that, drying shrinkage of shaft orientations occurs unevenly. Thus, it

originates in drying shrinkage being uneven, and there is a possibility of producing modification of a peripheral skin part etc. On the other hand, if the above C1/C2 exceeds 1.2, thickness of an inner circumference skin part will become thin too much compared with thickness of a peripheral skin part. So, when drying after that, there is a possibility of producing modification of an inner circumference skin part etc.

[0018]Like claim 4 and an invention of nine, it is preferred in the above-mentioned metallic mold that width of the above-mentioned slit part located in before a method of outside by one to 10 cell from a tip of the above-mentioned inner circumference lobe is wide compared with other slit width. As for a hollow type ceramic monolith carrier by which extrusion molding was carried out with the above-mentioned dice for shaping, intensity of the above-mentioned inner circumference skin part is high. So, even if it is a weak hollow type ceramic monolith carrier after extrusion molding and before desiccation, it is hard to produce modification of the above-mentioned inner circumference skin part etc. Therefore, a manufacturing process of the above-mentioned hollow type ceramic monolith carrier using the above-mentioned dice for shaping has a good product yield, and is efficient. [of a product yield]

[0019]Like claim 5 and an invention of ten, it is preferred in the above-mentioned metallic mold that width of the above-mentioned slit part located in before a method of outside by one to 10 cell from a tip of the above-mentioned periphery lobe is wide compared with other slit width. Also in the manufacturing process, a hollow type ceramic monolith carrier by which extrusion molding was carried out with the above-mentioned dice for shaping is a thing of high intensity, though natural after completion. Therefore, if it is in a hollow type ceramic monolith carrier which carried out extrusion molding for the above-mentioned dice for shaping, also in a manufacturing process, it is hard to generate a trouble. So, a manufacturing process of the above-mentioned hollow type ceramic monolith carrier has a good and efficient product yield.

[0020]A body part in which an invention of claim 11 has a cell of a large number surrounded by septum of honeycomb shape, A hollow hole provided so that it might penetrate to a longitudinal direction in a center section of this body part, For a wrap inner circumference skin part, have a peripheral face of the above-mentioned body part, and inner skin of a wrap peripheral skin part and the above-mentioned body part in between for one to 10 cell from the above-mentioned inner circumference skin part. It is in a hollow type ceramic monolith carrier making the located above-mentioned septum into a high strength part whose intensity is higher than a general part which is a septum located in a method of the outside.

[0021]A hollow type ceramic monolith carrier of this invention has the above-mentioned hollow hole in the center section of the body part like the above, and whole shape is tubed. And in the peripheral face, it has the above-mentioned peripheral skin part, and has the above-mentioned inner circumference skin part in inner skin. Therefore, the state where the above-mentioned septum has not exposed a peripheral face and inner skin of the above-mentioned body part is acquired, and the state where the above-mentioned peripheral skin part and an inner circumference skin part connected each septum is acquired. Therefore, when stress is applied from a peripheral face or inner skin of the above-mentioned body part, disruptive strength improves by existence of the above-mentioned peripheral skin part and an inner circumference

skin part.

[0022]Let a part for one to 10 cell of a septum which touches the above-mentioned inner circumference skin part be a high strength part whose intensity is higher than a general part of a method of the outside. Thereby, disruptive strength at the time of stress being applied from the above-mentioned inner skin side can be raised further. That is, in this invention, disruptive strength to stress from the inner skin side can be raised by leaps and bounds providing the above-mentioned inner circumference skin part and by making into a high strength part the above-mentioned septum which touches this inner circumference skin part. When the above-mentioned high strength part is less than a range for one cell from the above-mentioned inner circumference skin part, there are few improving strength effects by existence of a high strength part. Since the above-mentioned improving strength effect will approach saturation if a range for ten cells is exceeded from an inner circumference skin part, there is no necessity of providing a high strength part more not much. Thus, according to this invention, even if it is a hollow type, a hollow type ceramic monolith carrier which can secure isostatic intensity can be provided.

[0023]It is preferred to make the above-mentioned septum located in between for one to 10 cell from the above-mentioned peripheral skin part into a high strength part whose intensity is higher than a general part which is a septum located in the inner direction like an invention of claim 12. In this case, disruptive strength to stress from the peripheral face side can be substantially raised by making into the above-mentioned high strength part a septum which touches the above-mentioned peripheral skin part.

[0024]When the above-mentioned high strength part is less than a range for one cell from a peripheral skin part also in this case, there are few improving strength effects by existence of a high strength part. Since the above-mentioned improving strength effect will approach saturation if a part for ten cells is exceeded from a peripheral skin part, there is no necessity of providing a high strength part more not much.

[0025]As for a high strength part of the above-mentioned septum, like an invention of claim 13, it is preferred by making thickness larger than the above-mentioned general part to have raised intensity. In this case, by enlarging thickness, intensity of the above-mentioned septum can be raised certainly and easily, and the above-mentioned high strength part can be formed. Reduction of porosity of a septum, etc. can also perform formation of a high strength part of the above-mentioned septum.

[0026]When thickness of T1 and the above-mentioned inner circumference skin part is set to T2 for thickness of the above-mentioned peripheral skin part, it is [like / an invention of claim 14] preferred that ranges of T1/T2 are 0.8-1.2. Thus, by setting the ratios T1/T2 of the thickness T1 of the above-mentioned peripheral skin part, and the thickness T2 of the above-mentioned inner circumference skin part as the range of 0.8-1.2, when drying the above-mentioned extrusion molding body, the amount of drying shrinkage of shaft orientations becomes uniform. Thickness of a peripheral skin part becomes it thin that the above T1/T2 is less than 0.8 too much compared with thickness of an inner circumference skin part. So, when drying after that, the amount of drying shrinkage of shaft orientations becomes uneven, and

there is a possibility of producing modification of a peripheral skin part etc. On the other hand, when the above C1/C2 exceeds 1.2, thickness of an inner circumference skin part is thin, and when drying after that, there is a possibility of producing modification of an inner circumference skin part etc.

[0027]In the above-mentioned hollow type ceramic monolith carrier, it is preferred that occupation area ratios of the above-mentioned hollow hole in the end face are 6.25% - 56.25%. It is because there is a possibility that pressure loss [in / that the above-mentioned occupation area ratio is less than 6.25% / the above-mentioned hollow hole] may become large. It is because there is a possibility that exhaust gas purification performance of the above-mentioned hollow type ceramic monolith carrier may run short when the above-mentioned occupation area ratio exceeds 56.25%.

[0028]In a catalyst converter system arranged at an exhaust system of an internal-combustion engine, an invention of claim 15 this catalyst converter system, The 1st catalytic converter constituted using a hollow type ceramic monolith carrier of a statement in any 1 paragraph of claims 11-14, Many cells and peripheral faces which were surrounded by septum of honeycomb shape. Have the 2nd catalytic converter constituted using an inner substance type ceramic monolith carrier which has a wrap peripheral skin part, and the 1st catalytic converter of the above, Build in the above-mentioned hollow type ceramic monolith carrier which is arranged at the upstream of the above-mentioned exhaust system, and made the 1st catalyst support, and. A bypass passage allotted to the above-mentioned hollow hole and a purification channel which consists of many above-mentioned cells of a method of the outside, Between the above-mentioned bypass passage and the above-mentioned purification channel, have a passage switching means which changes a channel of the above-mentioned exhaust gas, and the 2nd catalytic converter of the above, It is arranged at the downstream of the above-mentioned exhaust system, the above-mentioned inner substance type ceramic monolith carrier which made the 2nd catalyst support is built in, and the 1st catalyst of the above is in a catalyst converter system carrying out an activity start at a temperature lower than the 2nd catalyst of the above.

[0029]This catalyst converter system has the two above-mentioned converters at least like the above, and kinds of catalyst which structure of a monolith carrier and this which are built in these were made to support differ. Therefore, both endurance and purification performance can be raised by using the 1st and 2nd catalytic converter of the above properly. That is, the above-mentioned catalyst converter system changes whether the above-mentioned exhaust gas is passed to the above-mentioned bypass passage of the 1st catalytic converter of the above, or it passes to the above-mentioned purification channel according to temperature of exhaust gas which flows through the above-mentioned exhaust system, or temperature of the above-mentioned hollow type ceramic monolith carrier.

[0030]For example, when temperature of the above-mentioned exhaust gas is low, it is made to pass to the above-mentioned purification channel. If it does so, taking advantage of the characteristic of the 1st catalyst of the above whose light on temperature is lower than the 2nd catalyst of the above that the above-mentioned hollow type ceramic monolith carrier was made

to support, low-temperature exhaust gas can be purified efficiently. When temperature of the above-mentioned exhaust gas is high, a channel of the above-mentioned exhaust gas is changed using the above-mentioned passage switching means, and it is made to pass to the above-mentioned bypass passage. Thereby, a light on temperature can stabilize for it and purify hot exhaust gas taking advantage of the characteristic of the 2nd catalyst of the above of having excelled in endurance highly, rather than the 1st catalyst of the above.

[0031]And by passing the hot above-mentioned exhaust gas to the above-mentioned purification channel, the above-mentioned hollow type ceramic monolith carrier can be overheated, and fault that the 1st catalyst of the above carries out heat condensation, and purification performance falls can be prevented. Therefore, the catalyst converter system of this invention can realize a operation effect of purifying exhaust gas efficiently, over a long period of time from low temperature to an elevated temperature.

[0032]The above-mentioned hollow type ceramic monolith carrier in the 1st catalytic converter of the above has the above-mentioned high strength part in a periphery of this inner circumference skin part while having an inner circumference skin part like the above. So, the above-mentioned hollow type ceramic monolith carrier has high disruptive strength at the time of stress of a thermal shock, vibration, and others being applied from the inner skin side, and can perform in expectation that high endurance can be demonstrated under a severe actual use condition.

[0033]As for the above-mentioned passage switching means, it is [like / an invention of claim 16] preferred to be constituted according to load of the above-mentioned internal-combustion engine, so that a change to the above-mentioned bypass passage and the above-mentioned purification channel may be performed. Load of the above-mentioned internal-combustion engine has high correlation with temperature of the above-mentioned exhaust gas, or temperature of the above-mentioned hollow type ceramic monolith carrier. Load of the above-mentioned internal-combustion engine can be presumed by vehicle information, such as an accelerator opening and suction air quantity. Therefore, according to the catalyst converter system which changes a channel of exhaust gas with load of the above-mentioned internal-combustion engine. Like the above, a operation effect that outstanding performance of purifying hot exhaust gas efficiently can be demonstrated over a long period of time from low temperature is realizable by a comparatively easy system configuration.

[0034]As for the above-mentioned passage switching means, it is [like / an invention of claim 17] preferred to be constituted according to temperature of a cooling medium of the above-mentioned internal-combustion engine, so that a change to the above-mentioned bypass passage and the above-mentioned purification channel may be performed. If it is water if the above-mentioned cooling medium is an internal-combustion engine of a water cooling type, and it is an air-cooled internal combustion period, it is air. And the above-mentioned water after cooling the above-mentioned internal-combustion engine, or temperature of air has high correlation with temperature of the above-mentioned exhaust gas, or temperature of the above-mentioned hollow type ceramic monolith carrier. Temperature of the above-mentioned cooling medium has a low temperature region, and it is measurable by a simple and cheap

temperature sensor.

[0035]Therefore, according to the above-mentioned cooling temperature, a operation effect that outstanding performance of purifying hot exhaust gas efficiently can be demonstrated over a long period of time from low temperature is realizable by a comparatively easy system configuration like the above. Substituting temperature of a part which is parts or peripheral equipment of the above-mentioned internal-combustion engine, and touches the above-mentioned cooling medium as a temperature of the above-mentioned cooling medium is also considered. For example, it is also possible to have the temperature of a radiator fin and an air-cooling fin, and to consider it as temperature of the above-mentioned cooling medium.

[0036]As for the above-mentioned above-mentioned passage switching means, it is [like / an invention of claim 18] preferred to be constituted according to combination of load of the above-mentioned internal-combustion engine and temperature of the above-mentioned cooling medium, so that a change to the above-mentioned bypass passage and the above-mentioned purification channel may be performed. Thus, according to combination of load of the above-mentioned internal-combustion engine, and temperature of a cooling medium, temperature of the above-mentioned exhaust gas can be presumed still more correctly. Therefore, an effect of purifying hot exhaust gas efficiently from low temperature can further fully be demonstrated, fully securing the endurance of the above-mentioned low-temperature activity catalyst like the above.

[0037]As for the 1st catalyst of the above, like an invention of claim 19 and claim 20, it is preferred that 300 ** or less of lights on temperature are the superthermal activity catalysts which are 200 ** or less more desirably. When a light on temperature of a catalyst which the above-mentioned hollow type ceramic monolith carrier supports exceeds 300 **, there is a possibility that exhaust gas immediately after putting an internal-combustion engine into operation cannot fully be purified. In particular, when a light on temperature of the above-mentioned catalyst is 200 ** or less, exhaust gas immediately after putting an internal-combustion engine into operation can further fully be purified.

[0038]

[Embodiment of the Invention]It explains using drawing 1 - drawing 6 about the dice for shaping and manufacturing method of a hollow type ceramic monolith carrier concerning the example 1 of an embodiment of example of embodiment 1 this invention. The dice 1 for shaping used by this example has the metallic mold 2, the periphery gate operating ring 3, and the inner circumference gate operating ring 4, as shown in drawing 1.

[0039]The above-mentioned metallic mold 2 has the introducing hole part 21 which formed the introducing hole 210 which introduces material, and the slit part 22 which formed the slit groove 220 which is open for free passage to the introducing hole 210, and fabricates material to honeycomb shape, as shown in drawing 2 (a) - (c). The slit part 22 has the shape projected rather than the circumference, and has formed the slit groove 220 in the shape of a quadrangle lattice. There is the introducing hole part 21 in which many introducing holes 210 were established so that it might be open for free passage to the crossing portion of the above-mentioned slit groove 220 in the rear-face side of the slit part 22.

[0040]The through hole 29 which inserts in the bolt 51 for fixing the inner circumference gate operating ring 4 mentioned later is formed in the center of the above-mentioned metallic mold 2. The pin hole 28 for fixing the periphery gate operating ring 3 mentioned later is formed in two places of a way outside the above-mentioned slit part 22.

[0041]Next, the periphery raised part 31 constituted so that it might extend from the peripheral edge of the above-mentioned slit part to the direction of extrusion as the above-mentioned periphery gate operating ring 3 was shown in drawing 3 (a) and (b), It has projected toward the inner direction from this periphery raised part 31, and has the periphery lobe 32 which has the gap C1 (drawing 1 (b)) between the above-mentioned slit parts 22.

[0042]The periphery raised part 31 is ring shape, and it is constituted so that the inner skin 310 may contact the peripheral face of the slit part 22 of the above-mentioned metallic mold 2. And the above-mentioned gap C1 is secured by making the height of this periphery raised part 31 larger than the height of the above-mentioned slit part 22. In this example, this gap C1 was set as 0.2 mm.

[0043]As shown in drawing 1 and drawing 3, the periphery lobe 32 is formed so that the periphery opposed face 321 which meets the above-mentioned slit part 22 may maintain the gap C1 between the slit parts 22 and it may project in an inner direction. The tapered surface 322 sloping so that it might be gradually extended along with the direction of extrusion is established in the inner circumference side of the periphery lobe 32. Shape which the tip of the periphery lobe 32 presents is made into the circle configuration doubled with the outside dimension of the hollow type ceramic monolith carrier 8 made profitably like. The pin hole 38 for fixing this to the above-mentioned metallic mold 2 is formed in the above-mentioned periphery gate operating ring 32.

[0044]Next, the inner circumference raised part 41 constituted so that it might extend from the center section of the above-mentioned slit part 22 to the direction of extrusion as the above-mentioned inner circumference gate operating ring 4 was shown in drawing 4 (a) and (b), It has projected toward the method of outside from this inner circumference raised part 41, and has the inner circumference lobe 42 which has the gap C2 (drawing 1 (b)) between the above-mentioned slit parts 22.

[0045]The inner circumference raised part 41 has the through hole 419 in the center, and it is presenting the cylindrical shape which has the peripheral face 410. And the above-mentioned gap C2 is secured with the height of the inner circumference raised part 41. In this example, this gap C2 was set as 0.2 mm. As shown in drawing 1 and drawing 4, the inner circumference lobe 42 is constituted so that it may project in the method of outside, where the inner circumference opposed face 421 which meets the above-mentioned slit part 22 is maintained [the gap C2 with the slit part 22]. The tapered surface 422 sloping so that the diameter might be gradually reduced along with the direction of extrusion is established in the periphery side of the inner circumference lobe 42. Shape which the tip of the inner circumference lobe 42 presents is made into the circle configuration doubled with the inner diameter dimension of the hollow type ceramic monolith carrier 8 made profitably like.

[0046]And the dice 1 for shaping of this example is obtained by attaching the above-mentioned

periphery gate operating ring 3 and the inner circumference gate operating ring 4 to the above-mentioned metallic mold 2. When a periphery gate operating ring is fixed to the metallic mold 2, as shown in drawing 1 (a) and (b), the periphery gate operating ring 3 is put on the peripheral part of the slit part 22 of the metallic mold 2, and it fixes by inserting the pin 55 in the above-mentioned pin holes 28 and 38.

[0047]When the inner circumference gate operating ring 4 is fixed to the metallic mold 2, as shown in the figure, the disc-like adjustment hill 45 which has the through hole 450 is prepared, and each through holes 450 and 29,419 are arranged for this adjustment hill 45, the metallic mold 2, and the inner circumference gate operating ring 4 on the same axis. And the bolt 51 is inserted in the through holes 419 and 29,450, and it binds tight and fixes with the nut 52. Thereby, the inner circumference gate operating ring 4 is fixed to the metallic mold 2.

[0048]Next, it explains per [which manufactures the hollow type ceramic monolith carrier 8 using the dice 1 for shaping of the above-mentioned composition] method. First, it sets at the tip of the extrusion molding apparatus of the screw type which does not illustrate the above-mentioned dice 1 for shaping. And the charge of a ceramic material kneaded in the extrusion molding apparatus is inserted, and extrusion molding is performed.

[0049]In this example, what added and kneaded a binding material and other ingredients to the powder by which weighing was carried out so that cordierite might mainly be constituted eventually was used as a charge of a ceramic material. And the charge of a ceramic material continuously extruded by the extrusion molding apparatus of the above-mentioned screw type is fabricated as the hollow type ceramic monolith carrier 8 by passing the above-mentioned dice 1 for shaping.

[0050]As shown in drawing 5, the peripheral skin part 81 is formed of the charge 88 of a ceramic material which passes through the gap C1 between the periphery lobe 32 of the periphery gate operating ring 3, and the slit part 22. Namely, the charge 88 of a ceramic material extruded from the slit part 22 which counters the periphery opposed face 321 of the periphery lobe 32, It flows into the gap C1 surrounded by the slit part 22, and the periphery opposed face 321 and the inner skin 310 of the periphery gate operating ring 3, and flows toward a center, and further, the course is changed in the tip of the periphery lobe 32, and it goes on to the direction of extrusion, and becomes the peripheral skin part 81.

[0051]As shown in the figure, the inner circumference skin part 83 is formed of the charge 88 of a ceramic material which passes through between the inner circumference lobe 42 of the inner circumference gate operating ring 4, and the slit parts 22. Namely, the charge 88 of a ceramic material extruded from the slit part 22 which counters the inner circumference opposed face 421 of the inner circumference lobe 42, It flows into the gap C2 surrounded by the slit part 22, and the inner circumference opposed face 421 and the peripheral face 410 of the inner circumference gate operating ring 4, and flows toward a periphery, and further, the course is changed in the tip of the inner circumference lobe 42, and it goes on to the direction of extrusion, and becomes the inner circumference skin part 83.

[0052]Here, it is also effective to make tip sectional shape of the above-mentioned periphery lobe 32 and the above-mentioned inner circumference lobe 42 into shape like drawing 13. In

this case, the gap C1 surrounded by the above-mentioned periphery opposed face 321 and the inner skin 310. Or the above-mentioned charge 88 of a ceramic material which flowed into the gap C2 surrounded by the above-mentioned inner circumference opposed face 421 and the peripheral face 410 is because it can flow smoothly towards the tip of the above-mentioned periphery lobe 32 or the above-mentioned inner circumference lobe 42 so that a circle may be drawn.

[0053]As shown in the figure, the charge 88 of a ceramic material by which is surrounded by the inner circumference skin part 83 and the peripheral skin part 81, and aggressiveness appearance is directly carried out from the slit part 22 is formed in the body part 82 of quadrangle lattice-like honeycomb shape. While these peripheral skin parts 81, the body part 82, and the inner circumference skin part 83 advance simultaneously, the hollow type ceramic monolith carrier 8 (drawing 6) which has the hollow hole 80 inside the inner circumference skin part 83 can be continuously manufactured by being formed in one.

[0054]And the obtained hollow type ceramic monolith carrier 8 has the hollow hole 80, and it has the inner circumference skin part 83 surrounding it in one in the inner skin of the body part 82. Therefore, the isostatic intensity of the hollow type ceramic monolith carrier 8 becomes the dramatically outstanding thing. Only by performing extrusion molding like the above, since the hollow type ceramic monolith carrier 8 of the above-mentioned composition is obtained, like before, the futility of material and a process addition are unnecessary and a manufacturing cost can also be reduced.

[0055]Although the honeycomb shape of the body part 82 showed the thing of quadrangular shape in the above-mentioned example, it is also possible to change this into a hexagon and others. Although shape of the above-mentioned slit part 22, the periphery gate operating ring 3, and the inner circumference gate operating ring 4 was made circular, it is also possible to change this into an ellipse form or racetrack shape, and other shape. . I will obtain each part size of the above-mentioned adjustment hill 45, the periphery gate operating ring 3, and the inner circumference gate operating ring 4, the size of the slit groove 220 of the slit part 22, the size of the introducing hole of the introducing hole part 21, arrangement, etc. It is also possible to change according to the size and shape of the hollow type ceramic monolith carrier 8 to carry out. A fixing method with the above-mentioned metallic mold 2, the periphery gate operating ring 3, and the inner circumference gate operating ring 4 can also apply use of a different jig or soldering, thermal diffusion, and other joining methods. Making shape of the above-mentioned hollow type ceramic monolith carrier 8 section abbreviation elliptical, as it is not limited to section approximate circle shape, it is shown in drawing 14 like the above and it is shown in section abbreviation quadrangular shape and drawing 15 is also considered. The shape of the above-mentioned hollow type ceramic monolith carrier 8 is good to have taken into consideration a position, a space, etc. which are installed, and also to determine.

[0056]The hollow type ceramic monolith carrier 8 manufactured in the example of two examples of an embodiment, As shown in drawing 7 and drawing 8, the septum 84 of intensity located the above-mentioned inner circumference skin part 83 and near [peripheral skin part 81] the above to the hollow type ceramic monolith carrier manufactured in the example 1 of an

embodiment is higher than other septa. In the above-mentioned hollow type ceramic monolith carrier 8, the septum 84 located in between for about 1 cell (one or more cells) from the above-mentioned inner circumference skin part 83 was made into the high strength part S2 with high intensity from the general part P which is a septum located in the method of the outside. The septum 84 located in between for about 1 cell from the above-mentioned peripheral skin part 81 was made into the high strength part S1 with high intensity from the general part P which is a septum located in the inner direction.

[0057]The dice 1 for shaping used by this example changes the metallic mold 2 based on the dice for shaping of the example 1 of an embodiment, as shown in drawing 9 and drawing 10. In the above-mentioned metallic mold 2, as shown in drawing 10, the width of the slit groove 220 located in the field S1 near the periphery of the above-mentioned slit part 22 and the field S2 of a center portion is set as these [S1] and a size larger than the width of the slit groove 220 of the field P of the general portion between S2. Specifically, the width dimension of the slit groove [in / for the width dimension of the slit groove 220 of the field P / 80 micrometers and the fields S1 and S2] 220 was 107 micrometers.

[0058]If the dice 1 for shaping constituted as mentioned above is used, the high strength part S1 of the above-mentioned septum 84 and S2 can raise intensity by making thickness larger than the general part P. Specifically, the thickness of the above-mentioned septum 84 was set to about 75 micrometers in about 100 micrometers and the general part P in the high strength part S1 and S2.

[0059]The thickness of the septum 84 can usually be chosen from the range of about 50-150 micrometers according to a use. And when performing the above-mentioned high strength part S1 and S2 by heavy-gage-ization, it is preferred to carry out by 1.1 to 3 times the thickness of the general part P. In seldom obtaining an intensity rise in the case of less than 1.1 times but exceeding 3 times, the problem that pressure loss becomes large too much crops up. About the field of the high strength parts S1 and S2 in the above-mentioned hollow type ceramic monolith carrier 8, it is also expandable to a part for ten cells. Other composition and operation effects are the same as that of the example 1 of an embodiment.

[0060]The example of three examples of an embodiment shows an example which applied the hollow type ceramic monolith carrier 8 of the example 2 of an embodiment to the catalyst converter system, as shown in drawing 11. The catalyst converter systems 7 of this example are the two catalytic converters 71 and an automobile exhaust purifying system which arranged two 72 ** in series, as shown in the figure. The catalytic converter 71 is CC catalyst and the catalytic converter 72 is UF catalyst.

[0061]The above-mentioned CC catalyst 71 arranges the above-mentioned hollow type ceramic monolith carrier 8, the butterfly valve 711, the actuator 712, and the bypass passage 713 in the case 710, and is constituted. The product made from an electromagnetism motor or the product made from a negative pressure drive may be sufficient as the actuator 712. To the hollow type ceramic monolith carrier 8, the light on temperature has supported with this example the superthermal activity catalyst which is 300 **. Specifically, Pd (palladium) with a mean particle diameter of 1 nm or less is supported.

[0062]The monolith carrier 720 of the conventional cylindrical shape is used for the above-mentioned UF catalyst 72, and Pt (platinum) and Rh (rhodium) are supported by this monolith carrier 720. Although many things are reported about these supporting methods and all can be applied, the method of making activated alumina and the precious metals calcinate together is desirable.

[0063]The above-mentioned CC catalyst 71 presses the hollow type ceramic monolith carrier 8 fit in the converter case 710 in the state of ******, and uses it for the mat made from an alumina fiber. Therefore, the isostatic intensity which bears the static strength (bolting stress) by the press fit, and the intensity which is specifically 1 or more MPa are needed for the hollow type ceramic monolith carrier 8. In the case of the conventional hollow type ceramic monolith carrier, it was difficult to secure this intensity. However, since the above-mentioned hollow type ceramic monolith carrier 8 has the peripheral skin part 81 and the inner circumference skin part 83 as shown in drawing 7 and drawing 8, and it has the high strength part S1 by heavy-gage-izing, and S2, it can secure isostatic intensity easily to 1 or more MPa. Therefore, when pressing fit in the converter case 710, the hollow type ceramic monolith carrier 8 is not destroyed.

[0064]Although the hollow hole 80 of the hollow type ceramic monolith carrier 8 is furthermore equipped with the tubular member as the bypass passage 713, the mat made from an alumina fiber is arranged the seal of exhaust gas, and for the purpose of vibration isolation also in the crevice between the hollow type ceramic monolith carrier 8 and the bypass passage 713. Although a mat is specifically wound around the bypass passage 713 and being pressed fit in the hollow hole 80 of the hollow type ceramic monolith carrier 8, the destruction from an inside can also be prevented in that case. This is because it has the peripheral skin part 81 and the inner circumference skin part 83 and has the high strength part S1 by heavy-gage-izing, and S2 like the above.

[0065]Next, the operation of the above-mentioned catalyst converter system 7 is explained using drawing 11. When the signal from the cooling-water-temperature sensor which the internal-combustion engine 79 does not illustrate at the start up [between the colds] time is below constant value, ECU77 takes out instructions to the actuator 712 and closes the butterfly valve 711. Therefore, all the exhaust gas discharged from the internal-combustion engine 79 passes the body part 82 of the hollow type ceramic monolith carrier 8.

[0066]Here, since the superthermal activity catalyst is supported by the septum 84 of the hollow type ceramic monolith carrier 8 like ****, the conventional CC catalyst is excelled in low-temperature activity, and the exhaust gas at the time between the colds can be purified efficiently. Then, temperature also rises and activates the UF catalyst 2. During internal-combustion engine operation, although middle load has closed the butterfly valve 711, when it becomes a heavy load and ECU77 judges that emission temperature specifically became not less than 80 **, ECU77 takes out instructions to the actuator 712 and opens the butterfly valve 711. Thereby, exhaust gas flows into bypass passage 713 inside. And thereby, as for a superthermal activity catalyst, heat condensation is controlled and endurance becomes high.

[0067]On the other hand, at this time, the UF catalyst 72 is being activated with the heat

transfer from the exhaust gas purified by already passed CC catalyst. Therefore, the detrimental constituent of the exhaust gas which newly changed the channel by the change of the butterfly valve 711 is purified with the UF catalyst 72, and does not almost have polluting the atmosphere. If load turns into below middle load, ECU77 will operate the butterfly valve 711 via the actuator 712, and will pass exhaust gas to the body part 82 of the hollow type ceramic monolith carrier 8 again. Like ****, superthermal activity, its improvement in heat-resistant, and also pressure-loss reduction are also realizable in this system with the combination of the hollow type ceramic monolith carrier 8 and the bypass passage 713.

[0068]The example of four examples of an embodiment is an example which controlled the catalyst converter system 7 of the example 3 of an embodiment according to the load of an internal-combustion engine. The control flow chart of this example consists of a control step of Steps S110 (it is only hereafter indicated as S110)-S130, as shown in drawing 16. S110 is a step which judges whether the load of an internal-combustion engine is more than W. S121 opens the above-mentioned butterfly valve 711 of the above-mentioned CC catalyst 71 wide -- exhaust gas -- bypass passage 713 inside of the above-mentioned hollow type ceramic monolith carrier 8 -- ** -- **** -- it is a step made like. S122 is a step which closes the above-mentioned butterfly valve 711 and into which it is made for exhaust gas to flow through the body part 82 of the hollow type ceramic monolith carrier 8.

[0069]Here, in this example, the load of the above-mentioned internal-combustion engine was presumed using the suction air quantity of an accelerator opening and an internal-combustion engine. It faces carrying out this example and preliminary experiment is carried out. As a result, when the operational status of the above-mentioned internal-combustion engine exceeded middle load, it turned out that the above-mentioned superthermal activity catalyst may carry out heat condensation. Then, as a threshold of the above S110, it set up as the above-mentioned W= middle load.

[0070]The above-mentioned catalyst converter system 7 was controlled using the constituted control flow chart like the above. In this control, when the load of an internal-combustion engine is less than W, the above-mentioned butterfly valve 711 is closed. If it does so, the whole of this exhaust gas of comparison low temperature sometimes emitted will pass the above-mentioned body part 82 of the hollow type ceramic monolith carrier 8. On the other hand, when the load of an internal-combustion engine is more than W, the above-mentioned butterfly valve 711 is opened wide. Thereby, the hot exhaust gas emitted at this time flows into bypass passage 713 inside of the above. Therefore, according to this example, the exhaust gas from low temperature to an elevated temperature can be efficiently purified like the example 3 of an embodiment.

[0071]In particular, in this example, the load of an internal-combustion engine is computed based on the above-mentioned accelerator opening and suction air quantity. Therefore, stable control can be carried out, making easy the system configuration of the above-mentioned catalyst converter system 7. In order to presume the load of the above-mentioned internal-combustion engine, the vehicle speed, acceleration, etc. besides the above-mentioned accelerator opening or suction air quantity can also be used like this example. Other

composition and operation effects are the same as that of the example 3 of an embodiment.

[0072]The example of five examples of an embodiment is an example which controlled the catalyst converter system 7 of the example 3 of an embodiment according to the cooling water temperature of an internal-combustion engine. The control flow chart of this example consists of a control step of S210-S230, as shown in drawing 17. S210 is a step which judges whether the above-mentioned cooling water temperature is not less than 80 **. S221 opens the above-mentioned butterfly valve 711 of the above-mentioned CC catalyst 71 wide -- exhaust gas -- bypass passage 713 inside of the above-mentioned hollow type ceramic monolith carrier 8 -- ** -- **** -- it is a step made like. S222 is a step which closes the above-mentioned butterfly valve 711 and into which it is made for exhaust gas to flow through the body part 82 of the hollow type ceramic monolith carrier 8.

[0073]The above-mentioned catalyst converter system 7 was controlled using the constituted control flow chart like the above. As a result, in this control, when cooling water temperature is less than 80 **, the above-mentioned butterfly valve 711 is closed. If it does so, the whole of this exhaust gas of comparison low temperature sometimes emitted will pass the above-mentioned body part 82 of the hollow type ceramic monolith carrier 8. On the other hand, when cooling water temperature is not less than 80 **, the above-mentioned butterfly valve 711 is opened wide. Thereby, the hot exhaust gas emitted at this time flows into bypass passage 713 inside of the above. Therefore, according to this example, the exhaust gas from low temperature to an elevated temperature can be efficiently purified like the example 3 of an embodiment.

[0074]In particular, based on cooling water temperature, the above-mentioned catalyst converter system 7 is controlled by this example. Therefore, stable control can be carried out by an easy and low cost system configuration. In addition, about composition and a operation effect, it is the same as that of the example 3 of an embodiment.

[0075]The examples of six examples of an embodiment are the example 2 of an embodiment, and an example which manufactures the hollow type ceramic isomorphism-like monolith carrier 8 with another manufacturing method, as shown in drawing 12 (a) - (c). That is, in this example, it replaces with the dice 1 for shaping in the example 2 of an embodiment, only the periphery gate operating ring 3 is attached to the metallic mold 2, and the ceramic monolith carrier as intermediate assemblies is manufactured using the dice for shaping which does not have the inner circumference gate operating ring 4. As the ceramic monolith carrier at this time is shown in drawing 12 (a), the body part 82 does not have the hollow hole, but it has the peripheral skin part 81. And the septum 84 of the center portion of the body part 82 and a peripheral part is made heavy-gage, and it is referred to as the high strength part S1 and S2. The field between the high strength parts S1 and S2 is the general part P.

[0076]Subsequently, as shown in drawing 12 (b), it leaves the peripheral part of the central high strength part S1, a ******** process is performed, and the hollow hole 80 is formed. Subsequently, as shown in drawing 12 (c), the charge of a ceramic material used as cordierite is arranged to the inner skin of the body part 82, and the inner circumference skin part 83 is formed in it. Then, processes, such as desiccation and calcination, are added and a final

product is obtained.

[0077]Thus, unlike the example 2 of an embodiment, a hollow type ceramic monolith carrier is not fabricated in this example at a stretch by one extrusion molding, Also when a ******** process is used, as shown in drawing 12 (c), it has the peripheral skin part 81 and the inner circumference skin part 83, and the high strength part S1 and the hollow type ceramic monolith carrier 8 which has S2 can also be manufactured further. Also in this case, the same operation effect as the example 1 of an embodiment is obtained.

[Translation done.]